



PATENT APPLICATION No. 10/661,466
Applicants: Franco Vitaliano and Gordana Vitaliano
Amendments to the Claims
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Claims

1. 1. (Original): A quantum information processing platform comprising,
2. a plurality of quantum information processing elements each having,
3. a cage defining a cavity formed from a plurality of self-assembling protein molecules,
4. and one or more cargo elements located within the cavity, wherein
5. at least one of the cargo elements comprises a qubit programmable into a plurality of
6. logical states.
1. 2. (Original): A quantum information processing platform according to claim 1, wherein the
2. quantum information processing elements comprise,
3. receptors for capturing and positioning the one or more cargo elements within the cavity.
1. 3. (Original): A quantum information processing platform according to claim 2, wherein
2. the quantum information processing elements comprise,
3. a vesicle located within the cage and enclosing the one or more cargo elements, wherein
4. the receptors extend through the vesicle to capture and position the cargo element within the
5. vesicle.
1. 4. (Original): A quantum information processing platform according to claim 3, wherein the
2. quantum information processing elements comprise,
3. adaptors disposed between the receptors and the cage and binding to the receptors.
1. 5. (Original): A quantum information processing platform according to claim 1, wherein the
2. quantum information processing elements comprise,
3. a vesicle located within the cage and enclosing one or more cargo elements.
1. 6. (Currently Amended): A quantum information processing platform according to claim 1,
2. wherein the quantum information processing elements comprise,
3. molecular tethers for capturing and positioning one or more cargo elements within and or
4. outside the cavity.

2 7. (Currently Amended): A quantum information processing platform according to claim 1,
3 wherein the quantum information processing elements comprise,
4 direct cage bonding for capturing and positioning one or more cargo elements within and
5 or outside the cavity.

1 8 (Currently Amended): A quantum information processing platform according to claim 1,
2 wherein the quantum information processing element comprise, receptors, molecular tethers and
3 direct cage bonding for capturing and positioning one or more cargo elements within and or
4 outside the cavity.

1 9. (Original): A quantum information processing platform according to claim 1, wherein the
2 one or more cargo elements of a subset of the quantum information processing elements further
3 comprises a non-permeable cavity.

1 10. (Original): A quantum information processing platform according to claim 3, wherein the
2 one or more vesicles of a subset of the quantum information processing elements further
3 comprises a non-permeable cavity.

1 11. (Original): A quantum information processing platform according to claim 1, wherein
2 the cage is electrically neutral and inhibits charge transfer between the cage and its cargo
3 elements.

1 12. (Original): A quantum information processing platform according to claim 1, wherein
2 the cage reduces the tendency of a plurality of logical states in a coherent state to collapse into a
3 decoherent state.

1 13. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage inhibits non-quantum information processing cargo elements from interfering with qubit
3 cargo element operation in other cages.

1 14. (Original): A quantum information processing platform according to claim 3, wherein the
2 vesicle is electrically neutral and inhibits charge transfer between the vesicle and its enclosed
3 cargo elements.

1 15. (Original): A quantum information processing platform according to claim 3, wherein the
2 vesicle is insulative and reduces the tendency of a plurality of logical states in a coherent state to
3 collapse into a decoherent state.

- 1 16. (Original): A quantum information processing platform according to claim 4, wherein the
2 receptors and adaptors are electrically neutral and inhibit charge transfer between the vesicle and
3 cage and their cargo elements.
- 1 17. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage reduces contaminant background radiation to cargo carried within the cage.
- 1 18. (Original): A quantum information processing platform according to claim 3, wherein the
2 vesicle reduces contaminant background radiation to cargo carried within the vesicle.
- 1 19. (Original): A quantum information processing platform according to claim 1, comprising
2 a self-assembling framework of cages to structurally support one or more of the self-assembling
3 quantum information processing elements.
- 1 20. (Original): A quantum information processing platform according to claim 1, comprising
2 a self-assembling electrically neutral substrate of cages to structurally support one or more of the
3 self-assembling quantum information processing elements.
- 1 21. (Original): A quantum information processing platform according to claim 1, comprising
2 a self-assembling framework of cages to structurally order one or more self-aligning ones of the
3 quantum information processing elements.
- 1 22. (Original): A quantum information processing platform according to claim 1, wherein
2 the one or more cargo elements of a subset of the quantum information processing elements is a
3 single cargo element comprising a qubit programmable into a plurality of logical states.
- 1 23. (Original): A quantum information processing platform according to claim 1, wherein the
2 one or more cargo elements of a subset of the quantum information processing elements are a
3 plurality of cargo elements.
- 1 24. (Original): A quantum information processing platform according to claim 23, wherein
2 the plurality of cargo elements are qubits programmable into a plurality of logical states.
- 1 25. (Original): A quantum information processing platform according to claim 23, wherein at
2 least some of the plurality of cargo elements are non-quantum information processing cargo
3 elements.
- 1 26. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein the one or more cargo elements of a subset of the quantum information processing
3 elements respond to stimuli internal and or external to the cage.

1 27. (Currently amended): A quantum information processing platform according to claim 3,
2 wherein the one or more vesicles of a subset of the quantum information processing elements
3 respond to stimuli internal and or external to the vesicle.

1 28. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein the one or more quantum information processing elements and their qubit and non-QIP
3 cargo are used in vitro and or in vivo.

1 29. (Currently amended): A quantum information processing platform according to claim 23,
2 wherein a subset of the non-quantum information processing cargo elements include one or more
3 therapeutic single task and or multitask in vivo and or in vitro agents.

1 30. (Cancelled):

1 31. (Cancelled):

1 32. (Cancelled):

1 33. (Original): A quantum information processing platform according to claim 23, wherein a
2 subset of the qubit and non-quantum information processing cargo elements include one or more
3 quantum dots.

1 34. (Original): A quantum information processing platform according to claim 23, wherein a
2 subset of the qubit and non-quantum information processing cargo elements include one or more
3 photonic dots.

1 35. (Original): A quantum information processing platform according to claim 23, wherein a
2 subset of the cargo elements include one or more liquids without dopants or with one or more
3 dopants of any type.

1 36. (Original): A quantum information processing platform according to claim 23, wherein a
2 subset of the qubit and non-quantum information processing cargo elements include a gas or
3 vapor without dopants or with one or more dopants of any type.

1 37. (Original): A quantum information processing platform according to claim 1, wherein the
2 at least one qubit of a subset of the plurality of quantum information processing elements are
3 programmed by one or more pulses of electromagnetic radiation.

1 38. (Cancelled):

1 39. (Cancelled):

1 40. (Cancelled):

1 41. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein ~~the~~ at least one qubit of a subset of the quantum information processing elements
3 ~~includes an unpaired electron~~ and the plurality of logical states of the qubit are defined by one or
4 more electron spin polarization properties and or attributes.

1 42. (Cancelled):

1 43. (Cancelled):

1 44. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein ~~the~~ at least one qubit of a subset of the quantum information processing elements
3 ~~includes a nitroxide molecule~~ one or more species of molecules.

1 45. (Cancelled):

1 46. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein ~~the~~ at least one qubit of a subset of the quantum information processing elements
3 includes a qubit that is photon-based and the plurality of logical states of the photon-based qubit
4 includes a coherent logical state.

1 47. (Original): A quantum information processing platform according to claim 1, wherein the
2 plurality of logical states includes a coherent state.

1 48. (Original): A quantum information processing platform according to claim 1, wherein the
2 plurality of logical states includes a coherent state at room temperature.

1 49. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage bioengineered in whole or in part.

1 50. (Original): A quantum information processing platform according to claim 1, wherein the
2 self-assembling protein molecule is a clathrin molecule

1 51. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage comprises self-assembling synthetic protein molecules.

1 52. (Currently amended): A quantum information processing platform according to claim 4,
2 wherein receptors, adaptors, and vesicle comprise natural and or synthetic protein molecules.

1 53. (Original): A quantum information processing platform according to claim 4, wherein the
2 receptors, adaptors, and vesicle are bioengineered in whole or in part.

1 54. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein at least a portion of the cage is ~~metal-coated~~ in one or more materials.

1 55. (Currently amended): A quantum information processing platform according to claim 4,
2 wherein at least a portion of the receptors, adaptors, and vesicle is ~~metal~~ coated in one or more
3 materials.

1 56. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage is substantially greater than one nanometer in diameter.

1 57. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage is at least about 50 nanometers in diameter.

1 58. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage is at least about 100 nanometers in diameter.

1 59. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage is symmetric with respect to a plane.

1 60. (Original): A quantum information processing platform element according to claim 1,
2 wherein the cage has icosahedral geometry.

1 61. (Original): A quantum information processing platform according to claim 1, wherein at
2 lease one of the plurality of cages includes a plurality of qubits and a subset of the plurality of
3 qubits are linearly positioned at vertices along a single plane using circulant ordering.

1 62. (Original): A quantum information processing platform according to claim 1, wherein a
2 subset of the quantum information processing elements are physically linked together.

1 63. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein a subset of the quantum information processing elements are functionally linked
3 together, either locally and or at a distance.

1 64. (Original): A quantum information processing element according to claim 1, comprising
2 an encoder for programming the at least one qubit of a subset of the quantum processing
3 elements.

1 65. (Original): A quantum information processing element according to claim 1 comprising,
2 a decoder for reading information out of the at least one qubit of a subset of the quantum
3 processing elements.

1 66. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein a subset of the quantum information processing elements form a hybrid system upon
3 their physical and or functional integration with non-invention elements *in vitro* and or *in vivo*.

1 67. (Original): A method for a quantum information processing platform comprising,

2 providing one or more quantum information processing elements, each quantum
3 information processing element comprising
4 a cage defining a cavity formed from a plurality of self-assembling protein molecules,
5 and
6 one or more cargo elements located within the cavity, wherein,
7 at least one of the cargo elements comprises a qubit programmable into a plurality of
8 logical states;
9 programming the one or more quantum information processing elements using an
10 encoder; and
11 reading information from the one or more quantum information processing elements
12 using a decoder.

68. (New): A quantum information processing platform according to claim 1, wherein the quantum information processing elements comprise,
a functionalized cage for attaching one or more elements external to the cage.